
Long-term ex vivo expansion of mouse hematopoietic stem cells.

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Public Summary:

This paper provides a step-by-step protocol for how to grown functional mouse blood-forming stem cells long-term in-a-dish. The method has numerous applications in stem cell biology, regenerative medicine, hematology, and immunology.

Scientific Abstract:

Utilizing multipotent and self-renewing capabilities, hematopoietic stem cells (HSCs) can maintain hematopoiesis throughout life. However, the mechanism behind such remarkable abilities remains undiscovered, at least in part because of the paucity of HSCs and the modest ex vivo expansion of HSCs in media that contain poorly defined albumin supplements such as bovine serum albumin. Here, we describe a simple platform for the expansion of functional mouse HSCs ex vivo for >1 month under fully defined albumin-free conditions. The culture system affords 236- to 899-fold expansion over the course of a month and is also amenable to clonal analysis of HSC heterogeneity. The large numbers of expanded HSCs enable HSC transplantation into nonconditioned recipients, which is otherwise not routinely feasible because of the large numbers of HSCs required. This protocol therefore provides a powerful approach with which to interrogate HSC self-renewal and lineage commitment and, more broadly, to study and characterize the hematopoietic and immune systems.

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